CLAIMS

We claim:

1. A method of noise reduction comprising:

adjusting the relative and overall intensity of orthogonal polarization components of a laser source at a first detector positioned at a first angle with respect to the laser beam axis so the first detector has the same sensitivity to polarization as a second detector positioned at a second angle with respect to the laser beam axis, forming a corrected signal, wherein said first angle and second angle are not equal;

subtracting the corrected signal from the signal at the second detector.

2. The method of claim 1, wherein the first detector is positioned along the laser beam axis and the second detector is positioned off the laser beam axis.

3. A method of reducing polarization mode fluctuation noise from a detected signal comprising:

separating the output of a laser source into orthogonal polarization components;

detecting the intensity of the orthogonal polarization components using a first detecting element positioned at a first angle with respect to the laser beam axis;

adjusting the relative intensity of the orthogonal polarization components and the overall intensity of the orthogonal polarization components so that the relative and overall intensity of the orthogonal polarization components at the first detecting element matches that of a second detecting element positioned at a second angle with respect to the laser beam axis, forming a polarization correction, wherein the first and second angles are not equal;

subtracting the polarization correction from the detected signal at the second detector, whereby the polarization mode fluctuation noise is reduced.

4. The method of claim 3, wherein the overall and relative intensity of the orthogonal polarization components is adjusted using two gain stages, each electrically connected to one orthogonal polarization component.

5. The method of claim 3, wherein the first detecting element comprises two detectors which each detect the intensity of one of the orthogonal polarization components.

6. The method of claim 3, wherein the separating is performed using a polarizing beam splitter.

7. The method of claim 3, wherein adjusting the relative intensity of the orthogonal polarization components is performed by selecting the angle of a polarizing element in the optical paths of the orthogonal polarization components.

8. The method of claim 7, wherein the polarizing element is a sheet polarizer.

9. The method of claim 3, wherein the overall intensity of the components is adjusted using a gain stage electrically connected to the first detecting element.

10. The method of claim 3, wherein the first detecting element is positioned along the laser beam axis and the second detecting element is positioned off the laser beam axis.

11. A method of noise reduction comprising:
monitoring the power of a laser source at a first selected angle with respect to the laser beam axis, forming a monitor signal;
separating the monitor signal into s- and p-polarized components;
adjusting the relative and overall amount of the s- and p-polarized components of the monitor signal so that the overall strength of the s- component of the monitor signal equals the amount of s-polarized component that a first detector at a second selected angle with respect to the laser beam axis detects, forming a s-polarized component

correction, and the overall strength of the p- component of the monitor signal equals the amount of p-polarized component that the first detector detects, forming a p-polarized component correction, wherein the first selected angle and second selected angle are not equal;

adding the s- and p-polarized component corrections, forming an overall corrected signal;

subtracting the overall corrected signal from the signal at the first detector.

12. The method of claim 11, wherein the first selected angle is along the laser beam axis.

13. The method of claim 11, wherein adjusting the relative intensity is performed by selecting the angle of a polarizing element in the optical paths of the components.

14. The method of claim 11, wherein the overall intensity of the components is adjusted using a gain stage.

15. A noise-reduced laser system comprising:

a laser having an output along a laser beam axis;

an adjustable polarizing element positioned at a first selected angle with respect to the laser beam axis;

a detector in optical communication with the adjustable polarizing element;

a gain element in electrical connection with the detector;

a scattering light detector positioned at a second selected angle which is not along the laser beam axis, in optical communication with the output of the laser;

means for adjusting the adjustable polarizing element and the gain element so that the noise detected at the scattering light detector is reduced.

16. The system of claim 15, wherein the adjustable polarizing element is positioned along the laser beam axis.

17. The system of claim 15, wherein the means for adjusting the adjustable polarizing element is an angle-adjuster.

18. The system of claim 15, wherein the adjustable polarizing element is a polarizing sheet.

19. The system of claim 15, wherein the adjustable polarizing element comprises a polarizing beam splitter and an angle-adjustable sheet polarizer.

20. The system of claim 15, wherein the laser is a He-Ne laser.

21. The system of claim 15, wherein the adjustable polarizing element comprises a polarizing beam splitter positioned along the laser beam axis that separates the output of the laser into orthogonal polarization output fractions, and an adjustable polarizing element in optical communication with the orthogonal polarization output fractions.

22. A method of actively reducing polarization mode fluctuation noise from a detected signal comprising:

separating the output of the laser source into orthogonal polarization components;

detecting the intensity of the orthogonal polarization components using a first detecting element positioned at a first angle with respect to the laser beam axis;

adjusting the relative intensity of the orthogonal polarization components and the overall intensity of the orthogonal polarization components so that the relative and overall intensity of the orthogonal polarization components at the first detecting element matches that of a second detecting element positioned at a second angle with respect to the laser beam axis, forming a polarization correction, wherein the first and second angles are not equal;

comparing a desired laser output setpoint to the intensity of the polarization correction;

adjusting the laser output so that the intensity of the polarization correction is the same as the desired laser output setpoint, whereby the polarization mode fluctuation noise is reduced.

23. A method of automated polarization mode fluctuation noise reduction from a detected signal comprising:

separating the output of a laser source into orthogonal polarization components;

monitoring the noise level of the laser source at a noise detector positioned at a first angle with respect to the laser output;

automatically adjusting either the relative or overall intensity of the orthogonal polarization components so that the noise level is reduced.